

Beginning with a discussion of the mathematical work of Laplace on surface-tension, the author points out that while it adequately expresses the effect as observed on curved surfaces, it gives no explanation of tension on plane ones, since it assumes the internal pressure to remain constant to the surface and to react vertically to it only. A more complete theory has been developed by van der Waals and his pupils. In the gas-equation, $(P+a/v^2)(v-b)=RT$, the a/v^2 represents the increase of pressure due to the mutual attraction of the gas molecules; and this, while only a trifling correction in gases, becomes an enormous pressure in liquids owing to the closeness of the molecules. When, however, a particle lies actually on the surface, it is only attracted by those below and around it, and not compressed by others above, so that the surface-layer is not only under a much lower pressure vertically, but the surface is under actual tension from the horizontal component of the attraction of the particles around and below it. Since the liquid particles not only exert attraction on others in the surface-layer, but on those of vapour or gas immediately above it, it is clear that the layer of rarefied liquid must pass without break into a layer of compressed vapour within the very small range of molecular attraction. Substances, like most salts, which dissolve with contraction of volume, increase of internal pressure, and diminution of vapour-pressure, also increase the surface-tension, while volatile liquids and many colloid organic substances diminish it.

It was first pointed out by Willard Gibbs, and afterwards, more fully, by J. J. Thomson, that bodies which diminish the surface-tension must tend to accumulate in that surface, while the reverse is the case with those which increase it. Freundlich sees in this the explanation of adsorption, positive and negative; and as such an effect on surfaces even between liquid and vapour can be shown experimentally to occur, it must be accepted as one of the causes, though whether it plays the important part which he assigns to it must remain uncertain until means are found at least of estimating its quantitative effect. Lagergren has suggested another physical theory of adsorption based on the idea that a surface is a region not of tension but of compression, and that substances which favour contraction of volume must accumulate there. While it seems impossible to accept the idea of a compressed layer at the surface of a liquid in contact with gas, it may well be that the liquid is compressed, and its surface-tension negative on solid surfaces, just as van der Waals assumes that gas is compressed on liquid ones, since the internal pressure and surface-tension of solids must be enormously higher than those of liquids. Neither theory adequately explains many of the individualities, both of absorbent surfaces and adsorbed substances, some substances being adsorbed at surfaces both of positive and of negative surface-tension, and one is inclined to believe, what indeed Freundlich admits, that chemical forces often come into play, and that adsorption resembles in many cases a sort of contact-solution of two bodies having chemical affinities, or, what is probably the same thing, opposite electric potentials.

H. R. P.

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TRAVELS IN ICELAND.

Island in Vergangenheit und Gegenwart, Reise-Erinnerungen. By Paul Herrmann. Teil iii., Zweite Reise quer durch Island. Pp. x+312+map. (Leipzig: W. Engelmann, 1910.) Price 7 marks.

THIS volume, although complete in itself, is a sequel to the two parts of "Island in Vergangenheit und Gegenwart" (1907), describing Herr Herrmann's travels four years previously. As before, the town of Torgau allowed him the long leave, provided a *locum tenens* (as schoolmaster), and relieved him of all anxiety during the illness resulting from an accident on the journey. The money was provided for the undertaking by the higher educational authorities, and we cannot wonder when he observes, "Surely few towns would act so munificently." The same guide was employed—he who accompanied Thoroddsen on his explorations—but although the surrounding circumstances were equally favourable, the book does not give quite such an impression of enthusiasm for Iceland in each and every aspect as on the former visit.

The route was by sea round the eastern, western, and northern coast, descriptions being given of all places called at, and the scenery passed. Herr Herrmann is pleased to think his former books are used as reference by tourists, and this part of the present work is specially for their benefit. He thinks the number of visitors will greatly increase when the steamship service is improved. He complains greatly of the accommodation now provided, and quotes and agrees with the opinion of another traveller (O. Komorowicz) "that if such were used in Germany for the transport of animals the S.P.C.A. would interfere!"

From Reykjavik the journey as far as Uxahryggtr was over familiar ground, but a new route was struck thence to Kalmanstunga—with an excursion to the Surtshellir caves—and westward round the Snæfellsnes peninsula, where the inhabitants were not found as lacking in progressive spirit as from other accounts was expected. Northward to Hrofberg with an appreciative allusion to the agricultural school at Olafsdalur. Then eastward to Hólar, the seat of an ancient bishopric and present agricultural school, and southward over the Kjolur to Geysir.

When the disadvantages of storms, cold, tent-life, and many minor catastrophes were overcome, and the pleasant neighbourhood of Hvítárvatn reached, an attempt to visit Frodardalur resulted, owing to an overtaking storm, in a severe fall from the pony. As a result of this accident the remaining portion of the journey, by Skalholt, Gullfoss, and round Reykjanes to Reykjavik, is undertaken with less spirit.

The author enlarges more on the geological aspect of the country than in the preceding volumes; in the meantime he has learnt much in this direction, but wishes the scientific reader to remember always that the descriptions, remarks, and conclusions are those of a layman only. The more he knows of Iceland the more his admiration of Thoroddsen, as a geologist and explorer, grows, and this appreciation is expressed in many references.

For younger geologists the entirely or partially

unexplored regions are pointed out, with hints and advice for future students. The folklore of the island is never lost sight of, and many extracts from the Sagas, and much historical matter, are interspersed in smaller print than the bulk of the narrative.

The writer's love of Iceland is not lessened by his second, and, as he regretfully remarks several times, final visit. It is interesting to note that in his opinion the union between Iceland and Denmark is political only, and that the ties between the two peoples are not likely to become deeper or closer.

The work is illustrated by many photographs and drawings, and a map of the route followed. Altogether it is interesting reading for lovers of Iceland or for prospective travellers over the same ground, although the detailed accounts, evidently intended for future tourists, of the reception, food, lodging, and cost at each stopping place are wearisome.

We regret that Herr Herrmann, with one exception, always alludes to our 'countrymen with some contemptuous phrase; the four years' interval has not softened his attitude towards the British traveller.

M. G. B.

HEREDITY AND ITS PHYSICAL BASIS.

Hereditary Characters and their Modes of Transmission. By C. E. Walker. Pp. xii+239. (London: Edward Arnold, 1910.) Price 8s. 6d. net.

THIS volume deals very clearly and briefly with the whole field of heredity, but perhaps its most interesting feature is the development of a theory as to the relative share borne by the chromosomes and other parts of the sexual cells in the transmission of hereditary characters. Stated somewhat crudely, the theory and the arguments which support it are as follows:—In the chromosomes are represented new characters (*i.e.* individual variations, mutations, and the like), while other parts of the cell are concerned with the propagation of old-established racial characters. That the chromosomes do not bear entities representing all the inherited characters is shown, firstly, by experimental evidence, such as the fertilisation of enucleated Echinoderm ova. For instance, Godlewski fertilised enucleated eggs of sea-urchins with the sperm of crinoids and obtained gastrulae which possessed pure maternal characters only. Second, through the reducing divisions half the chromatin is eliminated from the mature gametes. In spite of this, all the racial characters are shown by the individual which develops from the fertilised ovum. If one half the entities representing the racial characters of the father are absent from the sperm, it is so improbable as to be almost inconceivable that exactly those characters which are unrepresented will be supplied by the mother, seeing that the entities present in the ovum have been halved in number in a corresponding way.

Further, the racial characters are blended in inheritance, while individual variations and new characters are transmitted in a Mendelian way, the mechanism for which is supplied by the chromosomes. That the sexual characters also are propagated in this manner was suggested, first by Castle,

who supposed that both sexes were heterozygous in this respect; that is to say, that each individual contained both maleness and femaleness, the one latent and the other patent. Difficulties in the way of accepting this theory were removed by the suggestion that one sex was homozygous, its sexual character being recessive, while the other was heterozygous, and showed the dominant character. Credit for this emendation is given by the author to Bateson and Correns, but by right of priority it belongs to Geoffrey Smith. The latter, in his Naples monograph on the Rhizocephala (published in 1906), suggests that in the case of crabs the male is heterozygous since it exhibits female characters when castrated by the parasite *sacculina*, and must therefore have femaleness latent. The female, on the other hand, under similar circumstances, never shows male characters. He further surmises that in some parthenogenetic forms the heterozygous sex was the female, since from it both male and female individuals were at times produced.

The ever-present question as to the inheritance of acquired characters comes up again for discussion, and the author, who largely follows the sane reasoning of Archdall Reid, concludes that they are not inherited. Among other arguments in support of this view he includes that from the transmission of the characters of neuter individual in ants. This argument, he says, he has only met with twice before, namely, in the "Origin of Species" and in Poulton's "Essays on Evolution." He will no doubt be interested to know that it figures very largely in the controversy between Weismann and Herbert Spencer, published in the *Contemporary Review* in 1893 and 1894.

One more point must be raised, namely, the use of the word "regression" to signify something the reverse of progression, instead of in the special sense, acquired through biometry, in which it is generally used. The author has followed Archdall Reid in this respect, who, in his "Principles of Heredity," speaks of variations consisting of the addition of a character as progressive, and those resulting in the loss of a character as regressive. We hope he will also follow him in altering "regression" and "regressive" to "retrogression" and "retrogressive" in future editions.

E. H. J. S

GEOLOGY MADE EASY.

Geologie Nouvelle. Théorie Chimique de la Formation de la Terre et des Roches Terrestres. By H. Lenicque. Pp. xvi+271. (Paris: A. Hermann et Fils, 1910.) Price 7 francs.

THE book before us is the work of an engineer, who, having discovered that the received doctrines of geology rest largely on unproved hypotheses, has been impelled to frame a new geology for himself. The French scientific journals having ungratefully met this by a conspiracy of silence, it is left for us to introduce it to the public.

This new light in the dark places of the earth comes, it would seem from the acetylene lamp; for in the principle of that useful invention the author finds the clue to many phenomena which geologists have explained in ways less sensational. Silicates and